

Analysis on Electrical Automation Systems in Architectural Engineering

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ABSTRACT With the advancement of economic and science and technology, electrical automation has been widely used in modern construction projects. Describes the advantages of electrical automation system, analyze the composition and function of the electrical engineering building automation system implementation. Finally, focus on the electric automation system in the building project.

KEYWORDS

Electrical automation systems
Construction
Install application

1. Introduction

With the rapid socio-economic development, people's quality of life requirements are also will increase. Therefore more and more modern buildings are needed by the majority of consumers. Cross-application automation technology and communication technology to promote the construction of electrical installation technology continues to develop, making the modern building system technology continues to improve, to meet the needs of people's lives, and to achieve a modern building systems, installation of electrical automation systems is essential.

2. Advantages Electric Automation System

2.1. Efficient monitoring

After infiltration of modern building automation technology, staff can process management through the "acquisition of a deal with a feedback" module buildings digital control. The feedback of information to the control center by enabling electrical automation of modern architecture and efficient. It is real-time control to avoid failure.

2.2. High linkage

Construction project is covered by power distribution, lighting, fire protection, air conditioning and other systems of the overall project, construction work in the past often

low due to the linkage in the construction process due to certain aspects of the gaps affect the overall project [1]. But when the electrical automation technology integrated into all aspects of the work, the linkage between the building project will be able to significantly improve the links, automatic identification system architecture determines.

2.3. Security is strong

Modern building automation technology can be applied to improve the security of the system, the system response to abnormal situations. Automation (Engineering Science papers published papers—Guide Network river edit the buckle 2335162597) system can also be remote control mode remote control, thus minimize the harm failure to produce maintenance management personnel, the losses to a minimum.

3. Composition and function of the building automation system to achieve electrical

Building automation systems are including electrical power distribution monitoring system, lighting control systems, air conditioning and refrigeration systems, security monitoring systems. Their main controlling parts are as follows.

3.1. Substation monitoring system

The main power supply and distribution system for power distribution link, the use of modern computer control technology, communications technology and network technology, the use of anti-interference ability of communication equipment and smart electricity meters, and implement monitoring system management. Distribution Monitoring System by connecting the intelligent power monitoring instrumentation, low voltage circuit breakers with intelligent interface, integrated medium-voltage protection relays, transformers, DC panel, etc., for a variety of operating systems switch status and current, voltage, ac-

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tive power, reactive power, power factor and other power parameters in real-time collection and display of electrical parameters to achieve real-time monitoring, accident abnormal alarm, event recording and printing, finishing and printing statistical reports, integrated function of electric energy cost management and load monitoring, the equipment according to the most good running conditions, so that power supply system more secure, reasonable and economical operation. Improve the supply and distribution system reliability. While on duty load management can be analyzed according to the operation of power distribution system, rational management, remote control open and close, hide peak load, to achieve the modernization of power distribution system operation and management, as well as to achieve the purpose of saving energy [2].

3.2. Lighting control system

Lighting control system solves three important tasks: automatic lighting control start and stop, to save energy (engineering papers published scientific papers—Guide Network river edit the buckle 2335162597) Objective: start-stop control lighting equipment, mainly through audio, video and optical sensors for monitoring device so that the lighting place where it was active and the ambient light activated lighting devices, such as lobby, walkways, car parks and other public places, the basic requirements are not met while office, rest and other places have laws in accordance with the time schedule of the program control lighting [3]. Precise control of illumination, lighting and entertainment provided in line with work or rest needed to establish a reasonable and comfortable lighting environment: illuminance controlled mainly by the optical sensors with dimmer switch so that the light intensity changes with ambient light and smooth transition, in which people are always in a comfortable space illuminance range. Monitor lighting depending on the terminal state of the scene, in order to facilitate the timely detection of lighting fault repair by central monitoring system at every predetermined time switch control, monitor switch status and by the PLC logic, once the exception is alert and direct maintenance personnel arrive, accurate fault location timely maintenance.

3.3. Air conditioning and refrigeration systems

Air conditioning systems including air conditioning cold and heat source systems, air handling system. Fresh air systems, duct and fan coil systems and other accessories end connection between the devices components. The air-conditioning control system through microcomputer automatic control system consists of sensitive components, controllers, actuators, and other components of the adjustment mechanism to achieve the air-conditioning cooling, heat system, air handler system, fresh air system, fan coil system ends monitoring subsystem, ultimately to control temperature, humidity, air quality and energy savings.

Air handling system uses direct digital control DDC and

manual control of a combination of air temperature and humidity mixing process, after reaching environmental requirements, sent by the blower to achieve the purpose of the indoor temperature and humidity regulation. Since the temperature and humidity have certain latency, in order to save energy and meet the comfort room, the air-handling systems are often used in cascade control, air duct and return duct temperature, humidity detection serially [4].

Fresh air system for fresh air proportion of the air conditioning system and new air temperature and humidity control, air purge cycle savings of stale air inside the building to ensure that air is kept fresh. In addition, from the health point of view, no one inside the building must ensure that there is some fresh air. But get fresh air too. Energy consumption will increase fresh air, fresh air may be determined according to the size of the general concentration of carbon dioxide. So to control the size of the fresh air, usually carbon dioxide concentration detection to achieve. Security monitoring system. Security system is an important part of modern architecture. It offers to build video surveillance, detection and alarm, control management and automation auxiliary four parts.

3.4. Security monitoring system

The matrix switch microcomputer control system of four majors organic integration, form a complementary, interactive Internet security system. Mainly through various types of video surveillance cameras, monitors, analog or digital recording device, a lighting device to achieve the critical sectors, important facilities, video surveillance of public places, and shows with live recording alarm in alarm, complete the image verification: and For the import and export of image monitoring also includes an image recognition system, mainly through the card reader or biometric identification as proof of identification than through the image scanning to identify visitors. Detectors in different places through the installation Shuangjian mobile, passive infrared, broken glass, sound, microwave and active infrared and other types of detectors to achieve internal and perimeter defense detection, and alarm signal anomalies. Control and management by the central processor to the signal from each terminal in accordance with the priority level sorting, comparison, logical judgment and issuing a control signal, display control, and operational control. Automation is a complete and assist the extension of the host system, such as through internal, wireless two-way communication to communicate with the terminal of the main control room, to better identify and implement control functions, broadcast via cable to send commands to play music and broadcast emergency information, call transfer relief information to the outside world by telephone, by checking Patrol Patrol management staff is in place and so on. Gate contact point and lock status indication focused on video switching control, pan, tilt, zoom control, and self-detection.

4. Architectural Engineering Electric Automation

4.1. Building electrical engineering automation power requirements

Electric Automation course, inseparable from power, how to effectively use the power, not only can effectively conserve resources, but also can create (Engineering Science papers published papers—Guide Network river edit the buckle 2335162597) a good built environment. Construction engineering the central control room of a special power is directly supplied from the substation, a dedicated central management of indoor distribution cabinet. Power load requirement is not greater than the maximum power load of the surrounding buildings. For the power supply system also has the corresponding provisions: requires power supply frequency variation width should be less than ± 1 Hz, waveform distortion cannot be greater than 20%. For the power supply cannot be greater than 15% [5].

4.2. Selection of electrical building automation system

Each industry has its own sound system. For automation equipment for the construction industry, including not only related to building systems, including power lines, signal lines and network communications lines. J lines for the above, there are strict requirements. For power lines: general use PVC insulated copper wire, withstand voltage to the 500 V or more. For network communication lines will have a data transmission rate of compatibility, hardware costs, and construction equipment electrification system to decide. Different conditions to take a different network communication lines, such as in strong interference environments or long-distance transmission, then select the appropriate cable, and the general situation is the use of shielded twisted pair. Finally, the selection of the signal line is more stringent, ordinary copper wire and control cables are a good choice, of course, particularly if you want to use the cord or shielded cable according to the actual situation and control requirements.

4.3. Electrical Building automation automatic detection and control

4.3.1. State monitoring

The purpose is to monitor device status monitoring start

and stop status, switch status and switching status [6]. Specific status monitoring is: Run (Engineering Science papers published papers, Guide Network river edit the buckle 2335162597) status, manual, automatic state, switch status, fault status, and switch status from the stop state. Effective state monitoring construction equipment is a prerequisite to normal operation.

4.3.2. Fault Monitoring

This monitoring is usually in conjunction with the use of state monitoring. An exception occurs when a device fails, it should take the necessary urgent measures; for a major accident, the first time should be cut off the power; light failure should immediately run an emergency stop device.

5. Conclusion

Electrical automation in modern construction projects can take advantage of automation technology, communication technology, network technology and other automatic control them, become an important symbol of modern architecture. But the widespread application of the technology still faces some technical problems and challenges, thus building electrical engineer for automation technology to continuously explore. Promote the continuous progress of modern construction industry.

References

1. Tong, B. (2011). On the electric automation in architectural engineering. *Friends of Science*, 11.
2. Pan, W. H. (2013). On electrical automation applications in modern architecture. *Chinese Papers*, 4.
3. Wang, L., Lu, D., & Lv, X. J. (2012). Electrical engineering automation applications in the field of architectural design. *Science Communication*, 11.
4. Liu, H. (2012). On the application of automation technology in construction engineering. *Henan Science and Technology*, 12.
5. Yang, X. D. (2010). On the electric energy saving in construction engineering application. *Value Engineering*, 8.
6. Wu, J. F. (2012). Application of electrical automation technology in construction engineering. *Science and Technology*, 4.